John Dale #1843

TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

No. 602

1843

Insect Damage to White Spruce Cones and Seeds-- A Factor in White Spruce Regeneration

White spruce, one of the most valuable conifers in the Lake States area, normally produces a heavy crop of seeds every 2 to 6 years, and lighter crops in between. Natural regeneration, as well as development of adequate nursery stock, is influenced greatly by seed production during these heavy cone-bearing years. Therefore, any insect injury that reduces the quantity of seed, particularly in good crop years, also affects natural and artificial regeneration.

Many insects feed directly upon the seeds. Others feed on the very young cones, thereby preventing or curtailing normal seed development. Some of the hollow and aborted seeds often found in cones may be caused by insect injury to the young ovules.

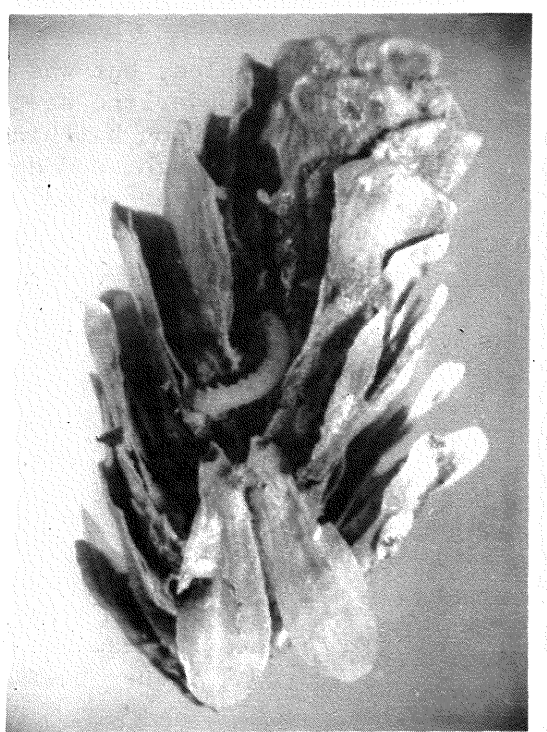

Figure 1.--Laspeyresia sp. larva in white spruce cone. Note damaged seeds.

In 1960, a prolific seed year for white spruce, quantities of cones were collected in the Lake States. Samples from collections made by the Kimberly-Clark Paper Company in Minnesota and Michigan, were examined and rated according to the presence or absence of insects or insect damage. All insects found were tentatively identified and an estimate was made of the extent of the injury (table 1).

The following insects, obtained from the samples, are discussed briefly.

Laspeyresia sp. (fig. 1). The larva of this moth was the most common and most destructive in the samples. As the larva matures, it bores down the rachis of the cone and feeds on the adjoining seeds. The larval tunnel and the hollowed seedcoats are characteristically packed with frass. Damage to seeds by this insect has been reported as high as 100 percent during poor cone years, but damage is generally about 25 percent.

Pegohylemyia sp. Infested cones frequently have more than one maggot of this fly attacking the seeds. The small exit hole is the only apparent external evidence of the insect's presence. Internal damage, however, is readily recognized by the resin and frass-filled tunnels between the scales. The seeds are generally entirely consumed, but a few seedcoat remnants may be found.

MAINTAINED AT ST. PAUL, MINNESOTA IN COOPERATION WITH THE UNIVERSITY OF MINNESOTA

Table 1.--Percentage of white spruce cones examined within each county that were damaged by insects

Insects involved	State and county								
	Minnesota		Michigan						
	St. Louis	Lake	Alger	Chippewa	Dickinson	Gogebic	Iron	Marquette	Ontonagon
Laspeyresia	4	12	0	4	10	14	16	8	4
Pegohylemyia	3	2	0	0	3	10	2	8	12
Dasyneura	20	8	0	0	1	0	6	0	0
Megastigmus	0	0	0	0	4	7	0	0	0
Rubsaamenia	0	0	4	0	0	0	0	4	0
Unknown borer	7	4	8	0	0	4	0	2	0
Unknown	3	4	0	4	0	7	2	2	0
Total	37	30	12	8	18	42	26	24	16
Basis: no. of cones examined	100	25	50	25	78	28	50	50	51

Dasyneura sp. The maggot of this midge was quite common in the samples, but was credited with little or no damage to the seeds. The eggs are laid under the scales at the base of the cone when the scales open to receive the pollen. Upon hatching, the young larvae bore into the cone and feed within the rachis. Although seed damage may be slight, a secondary effect may occur from the weakening of the bored stem which could cause premature drop of the cone.

Megastigmus sp. This small chalcid was found only in the cones from Michigan. The larva feeds entirely inside the seedcoat, completely destroying the developing seed. The number of seeds destroyed in any one cone is variable.

Rubsaamenia sp. The maggot of this midge normally feeds on the resin found within the cones and apparently does little damage. However, heavily infested cones may produce a number of aborted seeds.

Choristoneura fumiferana (Clem.), spruce budworm. The larva of the spruce budworm causes considerable damage by feeding on the developing cones. This feeding not only destroys some of the seed in the cones attacked, but also distorts the growth of the cone, thereby reducing the quantity of seed produced. Since this damage cannot be easily distinguished from some other surface-feeding insects, it has been listed in the table under unknown.

Unknown borer. Feeding by this insect was characterized by the presence of webbing containing a considerable amount of frass. From the appearance of the cone at the time of attack, it is doubtful that the insect concerned is the budworm. Only the seeds within the excavated area were destroyed. Damage occurred too late in the development of the cone to cause cone deformity.

J. L. BEAN, Entomologist
Lake States Forest Experiment Station
D. O. PRIELIPP, Forest Pathologist
Kimberly-Clark of Michigan, Inc.

April 1961